Chapter 2: GROUNDWATER PROTECTION SERVICES IN 2001

The Department of Natural Resources and Parks (DNRP) is the lead agency for the King County Groundwater Protection Program. While the agency maintains partnerships with numerous federal, state, and local agencies, also responsible for aspects of groundwater protection in King County, this report emphasizes the role of DNRP.

The agency's activities in the Groundwater Protection Program are grouped into four categories:

- Data Collection and Management.
- Education and Public Involvement.
- Regulatory and Policy Development.
- Program Coordination.

The following describes the basic elements and activities during 2001 of each program element, including its overall objective. Specific results from work in 2001; e.g., the results of ambient groundwater monitoring—are contained in Chapter 3 of this report.

Program Services – Data Collection and Management

Gathering new data and making existing information more accessible and useable emerged as central themes of groundwater management and data collection in 2001. In some cases, actions were taken as a direct response to vital projects and issues in King County. In other cases, action was focused on maintaining and improving the general knowledge of groundwater in King County. Knowledge of groundwater continues to affect future decisions and policy questions. Efforts at maintaining and improving King County's information about groundwater could change because of budget challenges in 2002.

Data Objectives

A main objective of the King County Groundwater Protection Program is to protect the region's groundwater from reductions in quantity and quality. To do this, it is essential to identify any groundwater problems and develop approaches to solve them. A wide-ranging monitoring program, designed to detect changes and trends early, is an integral part of understanding the issues.

Data Compilation and Database Development

The purpose of the groundwater database is to compile information about groundwater quantity and quality, to allow it to be compared over time and space, and to use it to generate conclusions about how and where the resource is changing. This kind of analysis is essential to design appropriate groundwater protection efforts. Entering data is extremely important. However, it is equally important to extract information in an

organized way for analysis, and to provide the information for independent interpretation by the public or the groundwater consulting community.

The Groundwater Protection Program's main tool for managing data is King County's comprehensive database called EQuIS. The database contains information for more than 6,800 locations, including well location/owner information, well log, water level quantity and water quality. This includes data for 1,300 locations, from a variety of sources, that the Program added in 2001.

The lack of a central clearinghouse for the data has made research on groundwater problems difficult in the past. A variety of people and agencies have collected groundwater information from wells in King County. For instance, water purveyors are required to compile and submit data that measures water quality and quantity, and DNRP has access to that information. During 2001, DNRP worked with Public Health to collect all information from small "Group B" water systems in King County. It already had similar data from the state Department of Health for larger, "Group A" systems in the County. The locations of public water systems are shown in Figure 2-1. State and federal agencies—including EPA, USGS, and Ecology—that are involved in groundwater issues also keep track of data on new well locations. All their information can now be found in EQuIS.

One of the sources of data for the Groundwater database is the "ambient" sampling program described later in this report. The information was first collected approximately 10 years ago at more than 60 sites as shown in Figure 2-1. Those sources were resampled in 2001 for pH, conductivity, temperature, dissolved oxygen, turbidity and water level as part of the certified Groundwater Management Plans, and the results from the chemical analysis of the samples were entered into EQuIS.

Responding to data inquires and requests from King County employees and the public is part of managing the groundwater data warehouse. Information is disseminated through spreadsheets, maps, graphics and files in the DNRP Geographic Information System (GIS). The Groundwater Protection Program also creates separate computer files with geographic data relevant to groundwater issues.

The DNRP GIS staff has created an interactive map program that contains groundwater data (iMap). The program allows data to be shared visually via the Internet. It can be found at **http://www.metrokc.gov/gis/mapportal/iMAP_main.htm**, under the title "groundwater project."

King County and the University of Washington Center for Urban Water Resources Management developed a data-sharing partnership in 2001. The project was part of an ongoing effort to map the geology of King County. The Groundwater Program shared its entire EQuIS well information with the University of Washington.

The Groundwater Protection Program and the Department of Natural Resources and Parks Solid Waste Landfill Unit are utilizing the EQuIS software. Both departments

work cooperatively in managing data with EQuIS by sharing software upgrades, discussing data input and output issues and resolving any problems related to data management.

Ambient Groundwater Monitoring

Protecting the health of King County citizens and the County's vital drinking water sources is an important part of the King County Groundwater Protection Program. Frequent sampling and analysis of groundwater is effective in providing early detection of water quality problems. Both DNRP and Public Health are engaged in this effort.

King County's Groundwater Protection Program conducted a comprehensive set of groundwater sampling in 2001. Two rounds of water samples were collected from nearly 70 groundwater wells in King County for the main component of the program (Figure 2-1). Samples were analyzed for a wide range of elements potentially in the water, including coliform, metals, nitrates, pesticides, and herbicides. The wells tested were located within the four King County groundwater management areas with State certified management plans (see Figure 1-1). The sampling wells were chosen over ten years ago because they provide a good representation of each area's entire groundwater aquifer, were evenly spread throughout the area, and reached varied ground depths. Results from samples taken during the initial development of the Groundwater Management Plans could be compared with the results from 2001 to look for significant or threatening changes in water quality or quantity that have occurred since the initial sampling (in some cases, 14 years ago).

The results of this monitoring did not demonstrate and widespread or serious groundwater contamination issues. See Chapter 3 for detailed results.

Partnerships with private citizens and local governments give King County access to other sampling sites and historical data within the County. Plans in 2002 include the completion of two more rounds of sampling in the wells, and development of an ongoing sampling regime, which is essential to track trends in groundwater.

Water Level Measurement

In addition to protecting King County's groundwater quality, it is equally important to monitor groundwater quantity. Monitoring water levels in wells documents any short-term fluctuations in groundwater aquifers (e.g., seasonal) and, over time, long-term increases or decreases in available water. It helps ensure that King County residents will have adequate water supplies for drinking, agriculture, and other uses.

The Groundwater Protection Program monitored water levels in approximately 50 wells as part of the ambient groundwater monitoring described above. The 50 were the only accessible wells for water level measurements of the nearly 70 wells selected for water quality sampling. Measurements were taken at least twice in 2001.

The 2001 sampling did not show any significant trends in groundwater quantity. See Chapter 3 for detailed results.

Partnerships with private citizens and local governments allowed King County the opportunity to obtain historical data and gain access to sampling sites. Plans in 2002 include between six to eight measurements of water levels in the wells. In order to accurately identify and track groundwater level trends, the Program will need to develop either additional sites and do more routine sampling, or will have to develop extensive partnerships and expand existing ones in order to gain access to the necessary data.

Focused Sampling

In addition to the ambient monitoring, DNRP staff conducted or coordinated focused sampling in several areas of known concern, or where additional data was needed for King County or regional water planning needs. Examples include the sampling on Vashon-Maury Island and along the Sammamish River. In nearly all cases, DNRP was able to conduct the sampling because of the willingness of property owners to either provide access or to actually participate in the sampling.

Vashon-Maury Island Focused Sampling for Nitrate and Chloride

In addition to the countywide monitoring program, DNRP staff also coordinates focused monitoring on Vashon-Maury Island. Vashon-Maury Island has been designated by the EPA as a "sole source aquifer." All groundwater on the island comes strictly from rainfall that travels down into the aquifer underlying the island, which is completely isolated from other aquifers by the salt water of Puget Sound. Protecting the aquifer is extremely important since it is the only source of drinking water for island residents.

The Vashon-Maury Island Groundwater Management Plan identified elevated levels of nitrate and chloride in groundwater as two immediate risks to the island's groundwater health. Elevated nitrate levels can result from failing septic systems, over- fertilization, or livestock waste. The condition can lead to adverse health effects for humans, especially young children. Elevated chloride levels can result from saltwater intrusion into the freshwater aquifer, which makes the water undrinkable. As a result, early detection of high nitrate and chloride levels is essential for protecting the island's drinking water.

In 2001, DNRP coordinated sampling at five groundwater wells in areas with apparently elevated nitrate levels, and three wells in areas with possible elevated chloride levels. The test results generally confirmed the elevated levels of these two contaminants. DNRP will arrange additional sampling in adjacent areas in 2002 to try to identify the source and extent of the elevated levels. These locations are shown in Figure 2-2.

Vashon-Maury Island Landfill Water Quality Sampling

During 2001, DNRP staff developed a plan for increased groundwater quality sampling in the landfill area on the west side of the island. The King County Solid Waste Division is monitoring groundwater on the actual landfill site; the DNRP effort added monitoring of groundwater in the adjacent areas downgradient from the landfill. DNRP planned to water quality samples from 11 groundwater wells located around the landfill site in February 2002 (Figure 2-2), and analyze them for a comprehensive list of parameters

including metals, herbicides and volatile organics. After evaluating these test results, follow-up sampling will be conducted on an as-needed basis throughout 2002.

Vashon-Maury Island Volunteer Water Level Monitoring

The Vashon-Maury Island Groundwater Management Plan calls for the use of citizen volunteers to collect groundwater level data. In May 2001, the groundwater program recruited and trained 25 Vashon-Maury Island citizens to measure water levels in their private and public groundwater wells (Figure 2-2). The volunteers made a 12-month commitment to measure water levels in their respective groundwater wells on a monthly basis. The data will supplement ongoing monitoring efforts to learn more about the island's groundwater quantity, which ultimately protects the island's groundwater.

The program allows citizens to take an active role in protecting their resources. In doing so, residents learn about their natural resources and what they can do to protect them. The goal is to continue the program through 2002 and beyond, with additional volunteers as needed. The action is an assurance that any significant changes in water levels will continue to be closely monitored.

Sammamish River Valley Groundwater Study

The Sammamish River (Figure 2-3) is the source of approximately 30 percent of the flow into Lake Washington. For many years, this statistic was the basis of the Sammamish River's identity. The river was known as a tributary to the lake. Now, the river and its valley are recognized as a migration corridor for fish and wildlife. The area also is known as the ecological link between Lake Washington, Lake Sammamish, and upland habitats and ecosystems in the Bear, Little Bear, North, and Swamp Creek basins.

Groundwater and outflow from Lake Sammamish are the primary sources of flow in the Sammamish River in the late summer and early fall. Groundwater is extremely important during the summer because it offsets high temperatures in the river caused by warm water from the lake. Without the input of cool groundwater, flow in the river would be too little and too warm to support or allow salmon migration.

King County's Sammamish Valley groundwater study began in 2001. Information in the study will be used to recommend habitat improvements that are well matched with current uses of the river corridor, which include recreation, agriculture, and urban development. The study will contain strategies for dealing with flow and temperature problems in the Sammamish River between Redmond, Woodinville, Bothell, and Kenmore. Input will be provided to help guide development of reclaimed water projects in the river corridor.

The Sammamish Valley groundwater study is based on developing partnerships and strategically combining existing data and resources with new data. For example, the plentiful rains in November and December 2001 provided opportunities to study the response of groundwater levels to changes in the water levels of Lake Sammamish and the Sammamish River. The responses were measured by monitoring wells that had been used in an earlier study by King County in Marymoor Park. The University of

Washington provided the equipment at no cost. The city of Redmond also provided access to a number of its monitoring wells.

Additional information on geology and groundwater in the valley was collected in 2001 through collaboration with the USGS and the Department of Ecology. The USGS provided water level data from more than 90 wells. The Department of Ecology documented the information on 800 pages of well logs. Preliminary cross sections and water level maps were developed through some of the well logs. The well logs represent more than 12,000 feet of drilling and nearly $1 million in drilling costs. The cross sections and groundwater maps will be used in 2002 to enhance future data collection and to develop a groundwater model.

The Sammamish Valley groundwater study, funded by the Reclaimed Water program in King County's Wastewater Treatment Division, also includes:

- Copies of consultant reports on file at the Department of Ecology. The reports document groundwater resources in Water Resource Inventory Area 8, which includes the Sammamish River Valley.
- A work plan for the Center for Urban Water Resources Management at the University of Washington. The plan contains information on obtaining additional boring logs and cross sections on the valley.
- Compiled information and calculations to help estimate how much groundwater in the valley comes from Lake Sammamish to the river valley.
- The completion of a water balance for Bear Creek that contains late summer conditions. The water balance will provide information on groundwater inflow to the Sammamish River Valley from the Bear Creek basin.

Green-Duwamish Water Quality Assessment and Sammamish-Lake Washington Analysis and Modeling Project

Technical support was provided in 2001 through the groundwater program to the Green-Duwamish Water Quality Assessment and the Sammamish-Lake Washington Analysis and Modeling Project. The overall goal of the projects is to provide information on water quantity and quality. The information fulfills requirements imposed by growth management and environmental legislation and is available for decisions related to resource protection.

The water quantity and quality information is obtained through monitoring and modeling activities for the watershed study areas in the Sammamish-Lake Washington Analysis and Modeling Project and Green-Duwamish Water Quality Assessment. The results of the monitoring and modeling activities are used to assess the impacts of land use and legislative changes on King County land and water resources. The projects are an important resource during wastewater capital planning, habitat conservation planning and salmon recovery, and watershed planning efforts. The projects also provide necessary information for ecological and human health risk assessments and habitat and biological assessments in state and federal mandates.

The Sammamish-Lake Washington Analysis and Modeling Project and Green-Duwamish Water Quality Assessment in 2001 focused on surface waters–lakes and streams within the study areas. Since groundwater affects water quantity and quality in these lakes and streams, representatives of the groundwater program helped design an approach for modeling the watersheds and collecting the data to support the models.

The Sammamish-Lake Washington Analysis and Monitoring Project and Green-Duwamish Water Quality Analysis is funded through King County's Wastewater Treatment Division.

Analysis of Arsenic Levels

On October 31, 2001, the U.S. Environmental Protection Agency announced the maximum acceptable level of arsenic in drinking water would be lowered from 50 parts per billion (ppb) to 10 ppb. The announcement followed a study by the National Academy of Sciences on the health risks–principally different forms of cancer–associated with drinking water that contains high levels of arsenic. Federally regulated water systems will have to comply with the new standard on January 1, 2006, and will have to report to customers before that date if they have detected arsenic in their supplies at over half the new regulatory limit. Systems with sources that exceed the new standard will either have to treat their water to remove the arsenic, or will have to find and develop new sources of supply.

Small water systems not subject to federal regulations (generally those with fewer than 15 hookups), and private wells, will only be subject to the new standards if they are adopted by the Washington State Board of Health or the Seattle-King County Board of Health.

King County has approximately 225 water systems that are subject to the new federal rules. There are an additional 1,600+ water systems, and an estimated 23,000 wells supplying water to individual homeowners, that are not subject yet to the new federal standards.

The King County Groundwater Protection Program at DNRP had taken a proactive approach in obtaining information on arsenic issue before the recent change in federal regulations. Existing information within King County's groundwater database has been used to identify the areas with arsenic levels that exceed the new standard. Groundwater samples, collected in December 2001 as part of King County's ambient groundwater monitoring program, were analyzed for arsenic levels. Data on arsenic levels also has been obtained from the U.S. Geological Survey and the Washington State Department of Health.

In general, the concerns regarding arsenic apply only to groundwater sources of water, not rivers and streams that supply the bulk of the population in King County. Several areas in unincorporated King County contain groundwater with arsenic levels that exceed 10 ppb. Many homeowners in these areas get their water from single-family wells or

small water systems regulated by Public Health. These locations are shown in Figure 2-4.

DRNP staff will be working with Public Health, the state Department of Health, and with the Groundwater Protection Committees to address health issues in areas and with systems that have elevated and unsafe levels of arsenic in their groundwater. This will include information now available on groundwater treatment options for private well owners and small water systems. This information will identify technical and other options, and will include address technical feasibility and cost. The information also will be included in education and outreach programs.

Program Services – Education and Public Involvement

Education Objectives

The Groundwater Education Program uses classroom-style presentations and public outreach to help students and adults learn more about the quality and quantity of groundwater. Students take part in interactive classroom activities and home water use inventory/audits. Adults and the general public are educated through community fairs, festivals and environmental gatherings.

Classroom Presentations

The Program includes some basic educational pieces. For example, DNRP staff use an interactive skit to teach children the elements of the water cycle. The "players" include the "sun," a student with gold sunglasses and a golden wand. The "sun" causes the evaporation of "water," blue tennis balls, into the "clouds," a student wearing a cotton-ball-covered cap with blue water beads. Students assume the roles of the chief elements of the water cycle as they follow the raindrops through the cycle.

DNRP staff also use a visual groundwater model to illustrate to students groundwater conservation and contamination. The model is a plastic container filled with pea gravel and covered by artificial turf. A ketchup pump makes it a working model that represents an aquifer, water table, and the infiltration of water and pollutants. By tipping the model, the water table flows out of the ground and will show a lake, stream, or river fed by groundwater. Pumping the model dry and using food coloring, colored drinks, syrup, and other so-called "pollutants" give the students a visual representation of the potential damage to their groundwater supply.

"CONTAMINATING" GROUNDWATER

THE WATER CYCLE

(Pictures by jimmy Johnson, Twin Lakes Elementary)

The students are also asked to conduct an inventory of their home as part of the lesson on conservation and contamination. They are asked to identify and assess water uses in and around the home. The students use their critical thinking and problem solving skills to make suggestions for groundwater conservation and protection. In the classroom, the students review their findings and the lifestyle changes that could positively affect the environment.

During 2001, DNRP staff made presentations to more than 2,800 students in 33 schools, located in 11 school districts, as shown in Figure 2-5.

Festivals

DNRP staff engage in public outreach for the Groundwater Protection Program primarily through exhibits, discussions and the dissemination of materials at community and environmental fairs. Interactive exhibits allow citizens the opportunity to discuss groundwater with King County employees. A groundwater model often is used to show the relationship of life above the ground to the water below the ground.

The King County Groundwater Protection Program set up a booth at a number of fairs and festivals (Figure 2-5). The asterisk indicates school oriented or sponsored events. (See Appendix B for a complete list.)

General groundwater conservation, protection, and other brochures are available to the public during festivals and fairs that involve the King County Groundwater Program. Through partnerships, local water districts, water departments and/or water purveyors also contribute their materials. The pamphlets cover a wide variety of topics such as:

- Local Groundwater Management Area Plans.
- Groundwater and drinking water.
- Citizen's Guide to Groundwater Protection, Environmental Protection Agency.
- Hazardous waste disposal.

- Natural landscaping and gardening.
- Care, maintenance and landscaping for people who are responsible for on-site sewage (septic tank) systems
- Water conservation.
- Endangered Species Act.
- Activity books for children.

Literature Production/Distribution

The Groundwater Protection Program used existing materials from various governmental agencies for public outreach and the educational programs. DNRP staff provided brochures to teachers to use as a follow-up to the King County presentations. (For a list of the most commonly used brochures, see Appendix B.)

Technical Presentations

The Groundwater Protection Program provides technical presentations tailored to the interests of a variety of groups. Presentations are made to professional societies, at public meetings, or to ad hoc organizations or groups.

The Program has not yet fully developed a cadre of technical speakers or marketed the presentations. However, staff members are getting into the community to educate the public about the importance of protecting groundwater. Presentations have included the following:

- An introductory "Groundwater 101" discussion during the training of volunteer water level monitors on Vashon Island.
- Background information given to the Natural Resources, Parks and Open Space committee of the Metropolitan County Council.
- A presentation on general Program scope and activities to the Maple Valley Unincorporated Area Council.
- A discussion of the Program data aspects with the Monitoring, Assessment, and Analysis Unit in the Water and Land Resources Division.

In 2002, the Groundwater Protection Program will be looking for more presentation opportunities, and will try to set up a technical speaker's bureau to provide a broader service.

Web-Based Materials

During 2001, staff at DNRP began development of an educational web page on the Internet. It will include:

Resources for teachers

- Links to sites designed to assist teachers or group leaders in presenting groundwater topics.

Fun for the young hydrologist

- Sites with enjoyable and interesting things to read and do.

Stewardship

- Information regarding how to work effectively as an individual or group to protect groundwater.

Other links

- Links to associations, agencies, etc., with an interest in groundwater.

Response to Public Inquiries

In 2001, DNRP staff responded to approximately 120 inquiries on groundwater issues from King County residents and others. This informal tally of inquiries does not include ongoing communication related to specific projects involving the Department of Development and Environmental Services, the Groundwater Protection Ordinance or committees.

E-mail addresses and telephone numbers for department employees are included on the King County Groundwater Protection Program Web page. Phone calls are routed to the staff members with the appropriate expertise. Additional questions from citizens have been answered by outreach staff members at festivals, samplers at private wells and with the help of the Water and Land Resources Division receptionist. All questions have been answered via e-mail, telephone, face-to-face discussions, or have been referred to the appropriate agency.

Examples of inquiries from the public include:

- Groundwater regulations for situations such as: setbacks for wells; developments in Well Head Protection Areas, Critical Aquifer Recharge Areas, or Special District Overlay areas.
- Concerns about groundwater quality, water level, or flow direction.
- Identity of the water system in a particular area (questions such as, “who provides water in my area and what is his/her phone number?”).
- Septic systems.
- Consulting firms.
- Groundwater data (water quality and water levels) in the vicinity of a specific project or where to obtain a report.
- Requests for copies of the Ground Water Management Plans.
- Possible frog mutations.

- Water rights associated with a property or the process needed to obtain water and water rights.
- Methods for analyzing water quality.

DNRP staff have been a resource on questions from persons outside of King County. A contractor in Wisconsin wanted to know how to enhance infiltration. A teacher at a school in the Netherlands asked for information about the Groundwater Protection Program in King County. A researcher in Nevada had heard (from South Africa) that in the past, King County investigated impacts from "human remains" on groundwater, and asked for information on that topic.

The Nisqually Earthquake on February 28, 2001, and potential impacts on groundwater, created some concern and generated some questions. Those included groundwater and its effects on a landslide into the Cedar River, reports of "very brown water" from some wells and damage to other wells, and how to find grant money to replace damaged water supplies.

Program Services–Regulatory and Policy Activities

Objectives

A key component of the comprehensive Groundwater Protection Program is a high level of coordination and support for all the elements of the program and related groundwater activities. The King County Council ordinance creating the Groundwater Protection Program (Ordinance 14214) established a number of regulatory and policy elements within the Program, and made the Department of Natural Resources and Parks the lead agency for implementation. The policy and regulatory responsibilities are provided by the Water Resources Policy Unit within the Director's office. As lead agency, the Department of Natural Resources and Parks is and will be responsible for such activities as:

- Providing support and serving as liaison to the Groundwater Protection Committees, and participating in implementation of the Groundwater Management Plans.
- Developing short- and long-term work plans for the Program.
- In cooperation with local jurisdictions, water purveyors, special purpose districts, and other interested parties, developing a long-term funding strategy to meet the needs of the program.
- Providing reports and meeting other commitments as provided in the Ordinance.
- Coordinating groundwater activities with state and federal agencies, tribes, local governments, water purveyors and users, and participating in such activities as Endangered Species Act studies and plans where groundwater may be an issue.
- Coordinating groundwater activities within King County with the Public Health, the Office of Regional Policy and Planning, and the Department of Development and Environmental Services.
- Recommending possible changes in the areas of public health regulation, countywide planning policies, land use practices (e.g., critical recharge area protection) and tracking of groundwater trends in environmental benchmarks.
- Developing comprehensive policies that integrate groundwater protection, surface water, stormwater, wastewater, and reclaimed water.

Some of these activities were already underway prior to the adoption of the Ordinance, and are described below. Others, such as development of an Annual Report, have timeframes that require action by the Department of Natural Resources and Parks over the next several years.

Groundwater Ordinance

Throughout 2001, the Department of Natural Resources and Parks supported the King County Council in its efforts to develop a structure and funding for a comprehensive, regional groundwater program in King County. The process included extensive stakeholder involvement, particularly from representatives of the groups that had

participated in the development of the Groundwater Management Plans. On September 24, the Council adopted the ordinance. It was subsequently signed by the Executive, and became effective in early December. A copy of the Ordinance is attached as Appendix A.

In addition to identifying the Department of Natural Resources and Parks as lead agency for the program, the Ordinance included the following key provisions and features:

- Statement of intent that a regional groundwater program be developed cooperatively.
- Statement of intent that the ordinance did not infringe on existing authorities, nor create new regulatory authority for King County.
- Statement of intent that all parties participating in groundwater protection work—King County, municipalities, special purpose districts, purveyors—are responsible for their own funding, policy and staffing decisions,
- Recognition of the State's legal authority to regulate groundwater withdrawals.
- Identification of a set of non-exclusive activities to be part of the County's groundwater protection program, based on available funding.
- Direction to the King County program to support (subject to available funding) implementation of activities within the certified groundwater management plans.
- Request to the Regional Water Quality Committee to make recommendations to the King County Council, between April and September 2003, on the efficacy of the program and on other specific elements (e.g., development of agreements and funding for regional groundwater protection services).
- Direction to the King County auditor to provide a report to the Council by July 2003 on groundwater services being provided.
- Creation of, and prescribing the responsibilities and procedures for, local Groundwater Protection Committees.

Groundwater Protection Committees

The Ordinance adopted by the King County Council established three Groundwater Protection Committees—one each for Vashon-Maury Island, East King County and Issaquah Creek Valley. The Council later amended the Ordinance to establish a Committee for Redmond-Bear Creek Valley. These four areas have certified Groundwater Management Plans. In the intent section of the Ordinance, the Council recognized that a draft plan is being developed for the South King County area and stated that the legislation was intended to complement and not replace the efforts of the advisory committee working on the plan. Each of the committees is to remain in existence through December 31, 2004.

Each Committee is to have at least ten members with representatives from various groups interested in groundwater issues. The groups include local governments, water and sewer purveyors, business, agriculture, and environmental and residential well users. Each

tribal nation with federally recognized rights within each groundwater management area is invited to participate. The state Departments of Ecology and Health, adjacent county governments, and Public Health as ex officio members also are invited to participate.

The Committees are to meet at least three times each year, and have a detailed set of responsibilities, which include:

- Advising the King County Executive and County Council on groundwater activities and issues and keeping elected officials and their organizations informed;
- Monitoring and participating in implementation of the Groundwater Management Plans and developing and recommending modifications to the plans;
- Reviewing and making recommendations on the short- and long-term work plans for regional groundwater needs;
- Coordinating community groundwater needs with local organizations;
- Providing annual status reports on their activities;
- Making recommendations on distribution and use of aquifer protection funds;
- Recommending changes to county planning policies affecting groundwater protection;
- Recommending services tailored to the unique needs of the local area;
- Providing advice on state groundwater regulation.

Appointments to the Committee are to be made by the King County Executive, subject to confirmation by the Council. The Committees are to operate under a set of bylaws developed by the County and adopted by the Committee, which may include creation of subcommittees. All meetings are to be open. Each committee is to solicit input from individuals, groups, agencies, and elected officials with interests in groundwater.

The Vashon-Maury Island Groundwater Protection Committee was the only Committee to begin operation in 2001. The committee held its first meeting on December 12. Members selected interim officers and developed a schedule of meetings and a list of agenda items through April 2002. The group also reviewed information provided by the Department of Natural Resources and Parks on activities and budget for groundwater protection services on the island for 2001, as required in Section 7 of the Ordinance.

A status report for the Vashon-Maury Island Groundwater Protection committee is included as Appendix C.

The Department of Natural Resources and Parks expects the remaining three Committees to begin meeting during the first half of 2002.

Assistance to the Department of Development and Environmental Services

Staff at DNRP in the Groundwater Protection Program provides technical expertise and support to King County's Department of Development and Environmental Services, the environmental/land use permit agency for King County.

Services provided in 2001 included:

- A review of the analysis of groundwater impacts in the Environmental Impact Statement and State Environmental Policy Act checklists.
- A review of groundwater monitoring plans (part of required mitigation).
- Testimony before the Hearing Examiner regarding the technical basis for a Department of Development and Environmental Services decision.
- A review of public comments.

The Department of Development and Environmental Services list of active groundwater projects in 2001 included:

- North Bend (Grouse Ridge) Gravel Mine (L01RE060).
- Snoqualmie Hard Rock Quarry (L00RE012).
- Trilogy & Redmond Ridge UPDs.
- Icy Creek (Franklin Plat) (L01P0001).
- Northwest Pipeline, Evergreen Expansion Project.
- Treemont Plat (L00MI078).

For additional information, refer to the Department of Development and Environmental Services web site at http://www.metrokc.gov/ddes/.

Assistance to Public Health–Seattle & King County

During 2001, staff at DNRP and Public Health initiated an regular series of meetings to discuss overlapping issues between the two agencies. These included development and funding of the Operation and Maintenance Program for On-Site Sewage (Septic) Systems at Public Health; implementation of the new federal standard for arsenic on small systems in King County; exchange of data regarding small public water systems; and participation in the Groundwater Protection Committees and implementation of the Groundwater Management Plans. For both agencies, the development of stable, reliable, and adequate sources of funding for their programs is a high priority that both agencies expect to address cooperatively in order to provide high quality and efficient services to the public. The ongoing meetings begun in 2001 are expected to continue in 2002.

Assistance to the Department of Ecology on Underground Injection Control Regulations

The EPA regulates the practice of injecting waste fluids into underground geologic formations. Originally, this Underground Injection Control (UIC) program was designed to protect groundwater from the injection of materials such as toxic wastes. EPA has broadened the scope of regulated practices to cover any waste, even stormwater runoff. In Washington, the Department of Ecology administers the federal regulations.

In 2000, EPA extended the program to additional "wells." The new definition of "wells" meant that large septic drainfields or similar infiltration facilities qualified as UIC facilities. DNRP owns and manages numerous such facilities as part of its stormwater flow control and water quality inventory. The new regulations required King County to provide information on these facilities to the Department of Ecology. Groundwater Protection Program staff helped classify the facilities, create the necessary database, and submit the required information to Ecology, through a partnership with DNRP's Stormwater Services unit. The database contains 31 Underground Injection Control facilities owned or maintained by DNRP.

Program Services – Program Coordination

An effective and efficient Groundwater Protection Program requires coordination of efforts with by DNRP with agencies and entities across jurisdictional authorities. The following sections describe some of these activities in 2001.

Coordination Objectives

The purpose of the program coordination is to assure efficient and effective use of public resources to provide groundwater protection to provide high value to King County residents in these services.

King County Agencies

The DNRP Groundwater Protection Program is a cooperative effort between agencies underneath the King County umbrella. In some cases, the coordination involves a service such as a technical review to the Department of Development and Environmental Services (DDES), groundwater investigation work on a Wastewater Treatment Division project, or land surveying work by the Department of Transportation for a groundwater project. Interfund transfers provide full budgetary accounting. Often, the coordination efforts happen because the various agencies provide overlapping services to the public.

Water and Land Resources Division

Groundwater Protection Program employees have a wide variety of responsibilities within King County:

- Groundwater data collection, management and analysis efforts take place in the Scientific and Technical Support area of the Science, Monitoring and Data Management unit in the Water and Land Resources Division.
- Groundwater Outreach and Public Involvement is mostly performed in conjunction with other outreach efforts in the Land and Water Stewardship Services unit in the Water and Land Resources Division.
- Groundwater Policy is handled in the Water Policy Unit, within the Director's Office of the Department of Natural Resources and Parks.

Employees with the Groundwater Protection Program also work with other units within the Water and Land Resources Division, mainly to coordinate efforts and provide technical support. The groups include:

- Basin Stewards, who coordinate monitoring efforts and outreach.
- Surface water monitors (stream gaugers), who provide data collection coverage for the entire water cycle.
- Data management and laboratory for statistical and analytical laboratory services.
- Surface Water Engineering Services and Ecological Services, sharing data and technical expertise. This unit often installs and monitors wells, especially for wetland investigations.

- Drainage Investigation and Facilities Maintenance, and Regulations and Compliance, which coordinates review of the State Environmental Policy Act, revision of the National Pollutant Discharge Elimination System, development of the Total Maximum Daily Load and Underground Injection Control compliance.

Solid Waste Division

The Groundwater Protection Program coordinates closely with King County's Solid Waste Division, specifically the Landfill/Environmental Unit in Engineering Services. The two divisions share the EQuIS database program, support each other on technical issues, training and data sharing. Solid Waste Division employees also participate in the Groundwater Protection Program Committees.

Through a partnership with the Solid Waste Division Landfill/Environmental Unit, the Groundwater Protection Program will sample private water supply wells near the closed Vashon landfill site in 2002.

Wastewater Treatment Division

Groundwater Protection Program staff work on several projects with the Wastewater Treatment Division (WTD), which is the source of funding for the work. The largest projects are connected to the Regional Wastewater Services Plan. Monitoring and modeling projects such as the Green/Duwamish Water Quality Assessment and the Sammamish-Lake Washington Analysis and Modeling Project are two examples in this category. Both projects will require input of groundwater data/expertise.

The additional use of Reclaimed Water is proposed in the Regional Wastewater Services Plan. The Sammamish River Valley Groundwater Investigation, regarding one of the most viable sites for the use of reclaimed water, is a requirement in the plan.

The Regional Wastewater Services Plan addressed the Inflow and Infiltration ("I&I") problem with the regional wastewater facilities. WTD and Groundwater Protection Program staff are engaged in a project specifically targeting I&I, with its relationship to groundwater as the source of infiltration. This project and others are managed through the Major Capital Improvements Section of the Wastewater Treatment Division.

Department of Development and Environmental Services

Coordination with the Department of Development and Environmental Services (DDES) focuses on projects that involve groundwater and trigger the State Environmental Policy Act (SEPA) review of plans and environmental impact statements. Developing and modifying local land use and permitting ordinances to protect groundwater from development impacts was identified as a priority in each of the Groundwater Management Plans, and will likely be a high priority for Program staff in the coming year.

Department of Transportation

The Groundwater Protection Program coordinates with King County's Department of Transportation in sharing data from a number of monitoring wells near Department of Transportation facilities. Department of Transportation survey services provide accurate elevations and locations of monitoring facilities. In the future, increased coordination will involve consideration of roadway drainage features as sources of infiltration to groundwater.

Public Health – Seattle & King County

One of the Groundwater Protection Program's most significant partnerships continues with the Public Health–Seattle & King County (Public Health). The two agencies share similar responsibilities. Public Health's public health mission includes possible health impacts from inadequate or unsafe groundwater (e.g., contamination); DNRP's mission focuses on management of groundwater as part of overall responsibilities for protection and preservation of public resources.

The two agencies initiated coordination meetings in 2001, and anticipate continuing them indefinitely to accomplish outreach, data collection, and sharing and policy objectives. Public Health is also an ex-officio member of the Groundwater Protection Committees, and is expected to participate in those committees during 2002.

Water Resource Inventory Areas (WRIAs)

Major resource management and protection activities are underway as part of the development of salmon recovery plans within each of the Water Resource Inventory Areas (WRIAs) in King County. Each WRIA group is organized under an Interlocal Agreement (ILA) that created a Steering Committee of elected officials, a Forum of all interested parties, and a Technical Committee of staff that focus on issues related to restoring fisheries in King County. DNRP staff participate in the technical work related to flows and groundwater, including sophisticated modeling that is being done. To the extent that base flows in streams from groundwater are identified as priority issues for fish habitat, Groundwater Protection Program staff will be engaged in WRIA efforts in the future.

Metropolitan King County Council

In 2001, the King County Council drafted and passed the Groundwater Protection Ordinance. The council also appointed members to the Groundwater Protection Committees (presently only Vashon–Maury Island). Members will be appointed to three more Groundwater Protection Committees in 2002.

State Agencies

King County maintains partnerships with agencies at other levels of government. The Departments of Ecology and Health are two of the agencies in the State of Washington that work with the Department of Natural Resources and Parks, and Public Health. Coordination activities with the state agencies are described in the following sections:

Washington State Department of Ecology

The Washington State Department of Ecology has responsibility for managing the "waters of the State," which includes groundwater. The agency's Water Resources Program maintains water rights and its Water Quality Program controls groundwater quality. The King County Groundwater Protection Program works closely with the Department of Ecology on data and policy issues. These coordination efforts include:

- King County is represented on the Department of Ecology's Interagency Groundwater Committee, which meets bimonthly.
- King County's Surface Water Management program has a National Pollution Discharge Elimination System (NPDES) permit for its control structures, which includes some consideration of groundwater impacts from Surface Water Management facilities. The terms of the permit are being negotiated with Ecology.
- As part of the Sammamish River Valley Groundwater study, Ecology's Environmental Assessment Program is assisting with a study of surface/ groundwater interactions through the placement of mini-piezometers adjacent to the river.
- Ecology staff are ex officio members of each of the Groundwater Protection Committees, and have been attending the meetings of the Vashon-Maury Island Groundwater Protection Committee.

Washington State Department of Health

Groundwater Protection Program staff work with the Washington State Department of Health (DOH) on projects mainly related to the state agency's responsibility for large ("Group A") public water systems across the state. Through its water system water quality database ("SADIE"), DOH provides important data for the Groundwater Protection Program.

DOH is also an ex officio member of each Groundwater Protection Committee, and is expected to participate in their activities during 2001.

Local Governments

King County is a regional government as well as a local government for the unincorporated areas. In 2001, the Groundwater Protection Program maintained partnerships with local governments for a variety of reasons:

- The cities of Redmond, Issaquah and Duvall shared the use of their water supply wells for ambient water quality sampling and data; Redmond has made some wells and data loggers available as part of the Sammamish River Valley Groundwater Study.
- Shoreline and Bothell staff managing their surface water have interests in groundwater interaction with their systems, including observation of significant infiltration rates to the Bothell system and into the Sammamish River.

- The Auburn Public Works Department has coordinated with DNRP regarding its Well Head Protection Area delineation.
- Kent and Renton have strong aquifer protection ordinances and efforts; Redmond is developing its own such program and has contacted the Groundwater Protection Program about pursuing this.
- The development of the Groundwater Protection Ordinance has involved various cities in King County and will continue through the representation by cities on Groundwater Protection Committees.

Special Purpose Districts

The main special purpose districts that the Groundwater Protection Program works with are water purveyors. Program staff frequently meet with a purveyor group on Vashon–Maury Island and have instituted a data-sharing program with them. Water districts such as Heights Water System and Gold Beach Water Association on Vashon, and Union Hill Water Association and Sammamish Plateau Water and Sewer District on the mainland of King County have allowed the use of wells for ambient water quality sampling.

Other Counties

Other counties in Washington are developing their own programs to protect groundwater. In 2001, King County maintained partnerships with Snohomish County, Mason County, and Island County to share approaches, data, analysis methods, and policy approaches. At the end of 2001, the Department of Natural Resources and Parks was preparing to train staff members in the EQuIS software system and to offer the same opportunity to employees with groundwater programs in Snohomish and Skagit Counties.

The counties of Pierce, King, and Snohomish also constitute the Tri-County grouping that has been developing a model response to the Endangered Species Act listings of chinook salmon and bull trout. Since groundwater provides base flow to tributary and mainstem streams that are important fish habitat, the Groundwater Protection Program coordinates with the Tri-County efforts.

The Groundwater Ordinance requires that each county adjacent to a Groundwater Management Area be invited to participate in the relevant Groundwater Protection Committee. As these Committees are established and begin functioning, adjacent counties may become engaged in groundwater work, particularly where there are shared aquifers across county boundaries.